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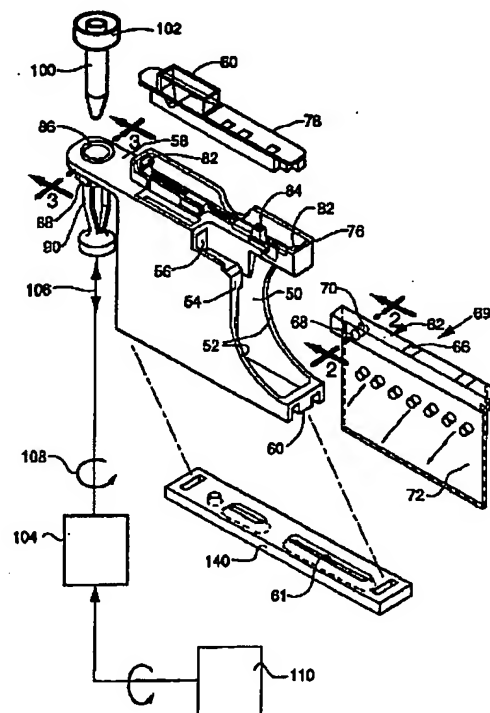
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(54) 【発明の名称】 キャリヤ装置

(57) 【要約】

【構成】 試料、試料に対する試薬を有する反応槽、お  
よび処理された試料を受容する容器の保持を可能にする  
分析用キャリヤ装置。【効果】 容器は処理された試料を分析装置へ移送する  
のを容易にする。

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## 【特許請求の範囲】

【請求項1】 末端部分を有する頂部部材；頂部部材の支持体；その上に形成された指令コードを有するヘッダーを持ちそして分析する試薬を中に入れた透明容器；ヘッダーに隣接して頂部部材上に着脱自在に装着される試料保持具；および頂部部材の末端部分に装着される反応槽保持具；を含み、ここで試料は反応のために反応槽中に入れることができそしてその後分析のために透明容器に移すことができる、反応槽中の試料の部分を容易にする分析用キャリヤ装置。

【請求項2】 試料保持具を、その下端が章動させられるように回転自在に装着する請求項1記載の分析用キャリヤ装置。

【請求項3】 反応槽保持具が保持具中に位置する反応槽を含む請求項1記載の分析用キャリヤ装置。

【請求項4】 反応槽が第1試薬を含む縦軸を有する内側容器と、内側容器の上方部分のまわりに同軸的に位置する第2試薬を含む外側容器からなる請求項1記載の分析用キャリヤ装置。

【請求項5】 反応槽保持具が保持具中で部分的に回転可能な反応槽を含む請求項1記載の分析用キャリヤ装置。

【請求項6】 反応槽が第1試薬を含む縦軸を有する内側容器と、内側容器の上方部分のまわりに同軸的に位置する第2試薬を含む外側容器からなる請求項2、3または5記載の分析用キャリヤ装置。

【請求項7】 透明容器が頂部部材から摺動離脱しうる請求項1記載の分析用キャリヤ装置。

【請求項8】 透明容器が頂部部材から摺動離脱しうる請求項2～6のいずれか記載の分析用キャリヤ装置。

## 【発明の詳細な説明】

## 【0001】

【産業上の利用分野】 本発明は分析すべき試料を、それらと分析試薬との結合およびその結果を更なる計装により測定するために移送する装置との結合を容易にするような仕方保持するキャリヤ装置に関する。

## 【0002】

【従来技術および問題点】 分析分野ではしばしば、分析する試薬の試料を種々の試薬、担体粒子等と結合することにより処理することが必要である。そのような分析に従うと次に反応装置中の処理された試料を、結果の処理を容易にする装置へ返送する必要がある。このことは試料の中間処理が典型的にイムノアッセイ技法の必要とする反復工程を含む場合に特に真である。これらは化学反応を促進する他の粒子の使用をすべて含む反応時間および洗浄のサイクルを包含する。イムノアッセイの場合、反応が完結するように粒子を懸濁状態に維持するために反応槽の内容物を渦動させる必要がある。そのような分析はまた、(複数の)試料が異なる装置ユニットから来る

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必要があるので困難を生じうる。処理中に試料と試薬を結合することのために更なる問題が生ずる。試料が必要な処理を受けること、そして他の試料と混同して分析の完全性が失われることがないことを確実にするために適正な試料の軌道を保つのが困難である。

## 【0003】

【問題を解決するための手段】 これらの問題の多くは、反応槽中の試料の分析を容易にする本発明の装置により解決される。この装置は末端部分を有する頂部部材、頂部部材の支持体、その中に入れられる分析試薬を有しそして下記ヘッダー上に形成された指令コードを含むヘッダーを有する透明容器、ヘッダーに隣接して頂部部材上に着脱自在に装着される試料保持具、および頂部部材の末端部分に装着される反応槽保持具を含み、ここで試料は反応のために反応槽中に入れそしてその後分析のために透明容器に移すことができる。

【0004】 特に好ましい態様では、本発明の装置は試料を章動(nutate)させようように装備される。反応槽自身は、第1試薬を含む縦軸を有する内側容器と、内側容器の上方部分のまわりに同軸的に位置する第2試薬を含む外側容器からなる。透明容器はその使用および更なる分析のための移送を容易にするために頂部部材から摺動離脱可能であるのが望ましい。

【0005】 【作用】 本発明の装置は3つのユニット、即ち試料、分析用試薬および別容器中の処理された最終試料、を一緒に保持する。このことは試料の処理を容易にし、そして分析の時間間隔中分析に必要なすべてのユニットを一緒に保持する。複数の試料カップを異なる試料入力で使用するためにキャリヤ上へ簡単に落とし込むことができ、そして反応槽内の物質について隔離培養が、キャリヤの構造により可能である。

【0006】 本発明を添付図面と関連させて考えれば一層明瞭に理解されよう。図中同じ参照番号は各図中の同じ構成要素をさす。

【0007】 第1、2および3図中に、本発明に従って構成されたキャリヤ中の1例の分解組立断面図をみることができる。キャリヤは一對の側壁52、頂部板58および基底支持体60により画定される成形中空ハウジング50を含むのがわかる。駆動バー140が両側壁間下部に位置しそして例えば接着により基底支持体に固定される。バー140はこのバーの従ってキャリヤの位置ぎめのための駆動または位置ぎめピンを受容するのを容易にする受け部61を有する。ハウジングはポリスルホンまたは硬質で強くそして化学的に不活性な他のいかなる適当なエンジニアリングプラスチックで形成されてもよい。前面(図で)の側壁には、頂部58と協働して分析用バック64の分析用バック頂部フレーム62を受容する仕切54が設けられる。分析用バックはデュボン社(E. I. du Pont de Nemours Company, 米国デラウェア州ウィルミントン)により販売されているaca<sup>1</sup> Autom

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aticClinical Analyzerに使用されるaca<sup>1</sup> バックと同じであってよく、そして好ましくは同じである。aca<sup>1</sup> バックは頂部に、進行中の個々の試験を表示する適当なセンサーで読みうる識別マーク66を有し、そしてプラスチックバック72中に物質を導入するのに使用しうる孔70を有する中空隔壁68を含む。aca<sup>1</sup> バックは周知であるのでこれ以上は説明しない。

【0008】いずれにしても、仕切54と頂部58は協働して、aca<sup>1</sup> バック頂部部材62を収容するに適合した孔56を画定し、  
10 斯てaca<sup>1</sup> バック頂部部材を、プラスチック材料で形成された下部サイドバック72と共にキャリヤ中に挿入しうる。サイドバックは2つの壁52間を摺動して挿入される。キャリヤ50の頂部は、貯留部80を含む着脱自在試料溜78を受容するに適合した細長いカップ状部材76をも含む。試料溜78は適当な成形クリップ82により開口76内の適所に保持される。試料保持具78の開口への接近を制御する取付造作84を備えてもよい。

【0009】キャリヤ50を完成するために、頂部部材58の端部は、反応槽保持具90を保持するに適合した  
20 フランジ88を有する孔86を有しうる。フランジ88はその内側が、反応槽保持具90の球状頂部とボールソケット形継手のように協働するソケットを画定するように凹面である。反応槽保持具90の下方部分は逆転空洞または受け部92を有するように、そしてその逆転空洞または受け部の上端に章動駆動部材からのピンを受容するに適合した孔94があるように、形成しうる。

【0010】本発明の他の態様では、反応槽保持具90は反応槽その自身であることができる。もっともその長期安定性および信頼性のためには保持具の使用が好ましいが、管保持具としての反応槽90が反応槽100を受容するに適合するなら、この槽はその上方部分に、例えばイムノアッセイ法で典型的に使用しうる反応試薬を保持するための同心室102を有する。

【0011】反応槽保持具90は自動装置104により章動させられる。2方向の線運動および1方向の回転運動を提供するいかなる適当な駆動装置も使用しうるが、係属中の前記出願に記載されているものが好首尾に使用されたものの1つである。この駆動装置は反応槽保持具  
40 90に線106（第1図）により示される2方向運動並

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びに線108により示される回転運動を提供する。駆動装置104はこれに回転運動を提供する単一の2方向駆動モータ110により動力を供給される。自動装置は、混合シリンダの縦軸から離れた点に円周と隣接して位置するピンを載置した混合シリンダを上昇させることにより、反応槽保持具90と係合する。換言するとピンは、混合シリンダを装着する軸に対し偏心した位置で混合槽90の底部と係合する。次に装置はシリンダを回転させ、これは槽の係合端を軌道運動させる。槽が2つの回転方向の自由度を有するようにすれば、反応槽保持具90の内容物は渦巻きまたは章動し斯てそれらを混合するであろう。混合シリンダを回転させる駆動110を反転させると槽の軌道運動は停止しそしてシリンダは下降して反応槽保持具90からはずれる。

【0012】

【発明の効果】上記キャリヤ装置は多くの利点を有しそして実際、3つの異なる機能を単一の装置中に結合することを可能にする。第一に、試料を保有する種々の分析装置からの試料カップを本装置の上方部分の適所にはめ込むことができる。第二に、試料の分析用試薬を含む反応管を、キャリヤユニット中に挿入できそしてキャリヤユニットから分離して処理できるキャリヤ管中に挿入しうる。第三に、試薬との反応が終った試料を、キャリヤから摺動離脱させうる別のユニット中に入れることができ、これを次に他の機械中で所望される処理および分析にまわすことができる。

【図面の簡単な説明】

【図1】本発明に従って構成されたキャリヤ装置の分解組立図。

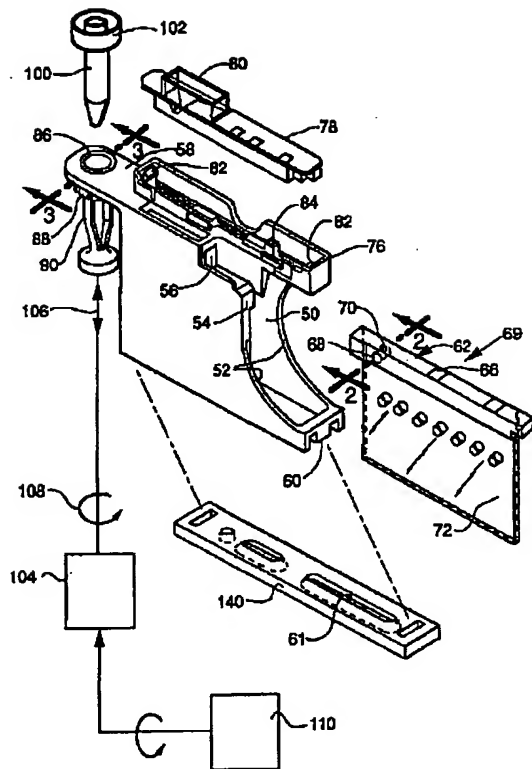
30 【図2】容器のストッパを貫通する図1の線2-2に沿った断面図。

【図3】特に試料保持具の構成を示す図1の線3-3に沿った断面図。

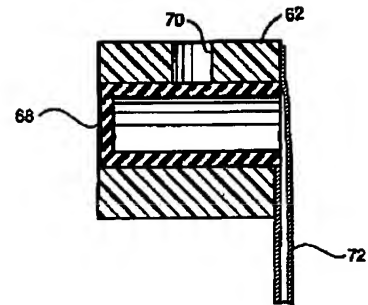
【符号の説明】

50 ハウジング  
52 側壁  
58 頂部部材  
60 基底  
72 プラスチックバック  
78 試料溜  
90 反応槽保持具

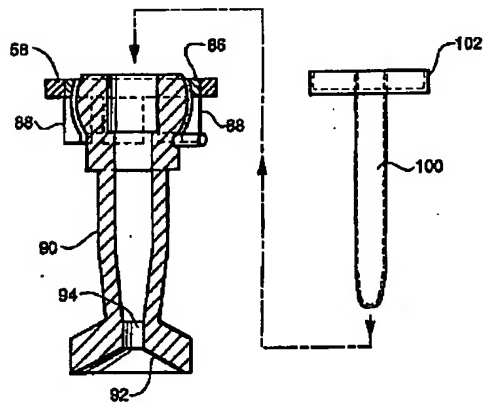
【図1】



【図2】



【図3】



フロントページの続き

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**Bibliography**

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- (51) [The 5th edition of International Patent Classification]

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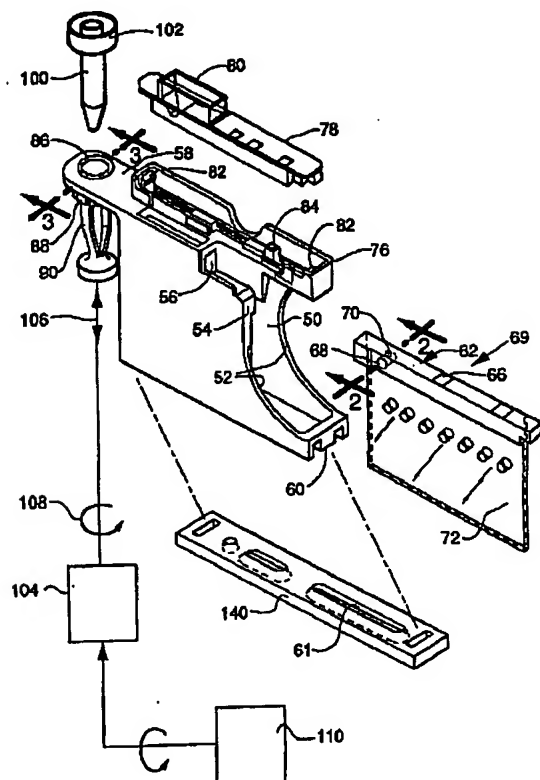
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(57) [Abstract]

[Elements of the Invention] Carrier equipment for analysis which enables maintenance of the container which receives the reaction vessel which has a reagent to a sample and a sample, and the processed sample.

[Effect] A container makes it easy to transport the processed sample to an analysis apparatus.

[Translation done.]



[Translation done.]

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## CLAIMS

[Claim(s)]

[Claim 1] It has the header which has the command code formed on it. top member; which has a part for an end — base material [ of a top member ]; — The transparency container which put the reagent to analyze into inside; Reaction-vessel holder; with which a part for the end of sample holder; with which adjoins a header and it is equipped free [ attachment and detachment ] on a top member, and a top member is equipped is included. A sample is carrier equipment for analysis which can put in into a reaction vessel for a reaction, and can be moved to a transparency container after that for analysis and which makes the part of the sample in a reaction vessel easy here.

[Claim 2] Carrier equipment for analysis according to claim 1 with which it equips free [ rotation ] so that the lower limit

may be made to carry out the nutation of the sample holder and it may deal in it.

[Claim 3] Carrier equipment for analysis according to claim 1 with which a reaction-vessel holder contains the reaction vessel located in a holder.

[Claim 4] Carrier equipment for analysis according to claim 1 which consists of an inside container which has the axis of ordinate in which a reaction vessel contains the 1st reagent, and an outside container containing the 2nd reagent located in the surroundings of the upper part part of an inside container in same axle.

[Claim 5] Carrier equipment for analysis according to claim 1 with which a reaction-vessel holder contains a pivotable reaction vessel partially in a holder.

[Claim 6] Carrier equipment for analysis according to claim 2, 3, or 5 which consists of an inside container which has the axis of ordinate in which a reaction vessel contains the 1st reagent, and an outside container containing the 2nd reagent located in the surroundings of the upper part part of an inside container in same axle.

[Claim 7] Carrier equipment for analysis according to claim 1 in which a transparence container can carry out sliding balking from a top member.

[Claim 8] Claims 2-6 in which a transparence container can carry out sliding balking from a top member are carrier equipment for analysis of a publication either.

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**DETAILED DESCRIPTION**

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the carrier equipment held by method which makes easy association with the equipment which transports the sample which should be analyzed in order to measure association with them and an analytical reagent, and its result by the further instrumentation.

[0002]

[The conventional technique and a trouble] In the analysis field, it is required to process by often combining the sample of the reagent to analyze with various reagents, a support particle, etc. It is necessary to return the sample by which it was processed in the reactor next when such analysis was followed to the equipment which makes processing of a result easy. This is truth especially when the intermediate processing intermediate treatment of a sample includes the repetitive process which immunoassay technique needs typically. These include the reaction time containing all of use of other particles which promote a chemical reaction, and the cycle of washing. In the case of immunoassay, in order to maintain a particle in the suspension condition so that a reaction can be completed, it is necessary to carry out vortex motion of the contents of a reaction vessel. Since such analysis may come again from the equipment unit from which a sample (plurality) differs and needs to equip all on a processing carrier, it may produce difficulty. The further problem arises for combining a sample and a reagent during processing. In order to ensure receiving the processing which needs a sample, and that mix up with other samples and analytic integrity is not lost, it is difficult to maintain the orbit of a proper sample. [0003]

[Means for Solving the Problem] Many of these problems are solved by the equipment of this invention which makes analysis of the sample in a reaction vessel easy. This equipment should carry out owner *Perilla frutescens* (L.) Britton var. *crispa* (Thunb.) Decne. of the base material of the top member which has a part for an end, and a top member, and the analytical reagent into which it is put into it. Including the transparence container which has a header containing the command code formed on the following header, the sample holder with which adjoin a header and it is equipped free [ attachment and detachment ] on a top member, and the reaction-vessel holder with which a part for the end of a top member is equipped, a sample can be paid into a reaction vessel for a reaction, and can be moved to a transparence container after that here for analysis.

[0004] Especially, in a desirable mode, the equipment of this invention is equipped so that the nutation (nutate) of the sample may be carried out and it may deal in it. The reaction vessel itself consists of an inside container which has an

axis of ordinate containing the 1st reagent, and an outside container containing the 2nd reagent located in the surroundings of the upper part part of an inside container in same axle. In order to make easy migration for the use and the further analysis, as for a transparence container, it is desirable for a top member to sliding balking to be possible.

[0005] [Operation] The equipment of this invention holds the last sample by which it was processed in three units, i.e., a sample, analytical reagents, and another containers together. This makes processing of a sample easy and holds all units required for analytic analysis among a time interval together. In order to use two or more sample cups in a different sample input, it can drop easily to up to a carrier, and isolation culture is possible by the structure of a carrier about the matter in a reaction vessel.

[0006] If this invention is related with an accompanying drawing and considered, I will be understood still more clearly. The same reference number puts the same component in each drawing among drawing.

[0007] The disassembly-and-assembly sectional view of one example in the carrier constituted all over 1st, 2, and 3 Fig. according to this invention can be seen. a carrier — the side attachment wall 52 of a pair, the top plate 58, and the base — it turns out that the shaping hollow housing 50 demarcated by the base material 60 is included. the drive bar 140 — the both-sides wall Mashita section — being located — and adhesion — the base — it is fixed to a base material. It has the receptacle section 61 which makes it easy that a bar 140 receives the drive for positioning of this bar, therefore a carrier, or a positioning pin. Housing may be formed by what kind of suitable engineering plastics of an and also [ it is inactive strongly and chemically in polysulfone or hard ]. The batch 54 which collaborates with a crowning 58 in a front side attachment wall (in drawing), and holds the pack top frame 62 for analysis of the pack 64 for analysis is formed. The pack for analysis is acaR used for acaR AutomaticClinical Analyzer currently sold by Du Pont (E.I. du Pont de Nemours Company, U.S. Delaware Wilmington). It is preferably [ similarly to a pack ] the same. acaR A pack has the identification marking 66 which can be read by the suitable sensor which displays each on-going trial on a crowning, and contains the hollow septum 68 which has the hole 70 which can be used for introducing the matter into the plastics pack 72. acaR Since a pack is common knowledge, it is not explained any more.

[0008] Anyway, a batch 54 and a crowning 58 collaborate and are acaR. The hole 56 which suited holding the pack top member 62 is demarcated, and it is \*\*\*\* acaR. A pack top member can be inserted into a carrier with the lower side pack 72 formed with plastic material. A side pack slides on between two walls 52, and is inserted. The crowning of a carrier 50 also contains the long and slender cup-like member 76 which suited receiving \*\*\*\*\* 78 containing the reservoir section 80 which can be detached and attached. \*\*\*\*\* 78 is held with the suitable shaping clip 82 in the proper place in opening 76. You may have the attachment fixtures 84 which control approach to opening of the sample holder 78.

[0009] In order to complete a carrier 50, the edge of the top member 58 may have the hole 86 which has the flange 88 which suited holding the reaction-vessel holder 90, and which is prolonged caudad. A flange 88 is a concave surface as the socket in which the inside collaborates like the spherical crowning of the reaction-vessel holder 90 and a ball-and-socket-type joint is demarcated. As there is a hole 94 which suited receiving the pin from a nutation driving member to the upper limit of the inversion cavity or the receptacle section, the lower part part of the reaction-vessel holder 90 can be formed so that it may have an inversion cavity or the receptacle section 92.

[0010] In other modes of this invention, the reaction-vessel holder 90 can be the self of \*\*\*\*\*. But although use of a holder is desirable for that long term stability and dependability, if the reaction vessel 90 as a tubing holder suits receiving a reaction vessel 100, this tub has this ventricle 102 for holding the reaction reagent which can be typically used by the immunoassay method into that upper part part.

[0011] The nutation of the reaction-vessel holder 90 is carried out with an automatic gear 104. It is one although any suitable driving gears which offer the linear motion of a 2-way and rotation of one direction can be used, and what is indicated by said application under connection was used for the good result. This driving gear offers rotation shown in the 2-way movement list shown in the reaction-vessel holder 90 by the line 106 (Fig. 1) by the line 108. Power is supplied to a driving gear 104 by the single 2-way drive motor 110 which provides this with rotation. An automatic gear engages with the reaction-vessel holder 90 by raising the mixed cylinder which laid the pin which adjoins a periphery and is located in the point which is separated from the axis of ordinate of a mixed cylinder. If it puts in another way, a pin will engage with the pars basilaris ossis occipitalis of a mixing chamber 90 in the location which carried out eccentricity to the shaft equipped with a mixed cylinder. Next, equipment rotates a cylinder and this carries out orbital motion of the engagement edge of a tub. if it is made for a tub to have the degree of freedom of two hands of cut — the contents of the reaction-vessel holder 90 — a whorl or a nutation — carrying out — \*\*\*\* — they are mixed — I will come out. If the drive 110 which rotates a mixed cylinder is reversed, the orbital motion of a tub stops, and a cylinder will descend and will shift from the reaction-vessel holder 90.

[0012]

[Effect of the Invention] The above-mentioned carrier equipment carries out owner *Perilla frutescens* (L.) Britton var. *crispa* (Thunb.) Decne. of many advantages, and actually makes it possible to combine three different functions in single equipment. The sample cup from the various analysis apparatus which hold a sample in the first place can be inserted in the proper place of the upper part part of this equipment. It can insert into carrier tubing which can insert the coil which contains [ second ] the analytical reagent of a sample into a carrier unit, and dissociates from a carrier unit and can process. It can put in into another unit which is made to carry out sliding balking and deals [ third ] in the sample which



the reaction with a reagent finished from a carrier, and this can be turned to the processing and analysis for which it asks in other machines next.

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[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] The exploded view of the carrier equipment constituted according to this invention.

[Drawing 2] The sectional view which met the line 2-2 of drawing 1 which penetrates the stopper of a container.

[Drawing 3] The sectional view which met the line 3-3 of drawing 1 which shows especially the configuration of a sample holder.

[Description of Notations]

50 Housing

52 Side Attachment Wall

58 Top Member

60 Base

72 Plastics Pack

78 \*\*\*\*\*

90 Reaction-Vessel Holder

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[Translation done.]

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DRAWINGS

[Drawing 1]



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**Carrier device.**

Patent Number: EP0525577, A3, B1  
 Publication date: 1993-02-03  
 Inventor(s): BERNSTINE ROBERT ERIC (US); NURSE COLIN A (US)  
 Applicant(s): DU PONT (US)  
 Requested Patent: JP5249123  
 Application Number: EP19920112402 19920720  
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 EC Classification: B01F11/00C1; B01L3/00C6; G01N35/02  
 Equivalents: CA2074395, DE69209181D, DE69209181T, US5254315  
 Cited Documents: EP0435481; US4066412; US4004883; US4058367; FR2350393; US4980293; EP0204109; US5104231

**Abstract**

An analytical carrier device permits the holding of a sample, reaction vessel with reagents for the sample, and a container for receiving a processed sample. The container facilitates transfer to an analytical device for analysis.



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**Description****Cross Reference to Related Patent Applications**

This invention discloses materials which is disclosed and/or claimed in a patent application entitled Vortex Mixer Drive, Serial No. , filed (IP-0801) and also an application entitled Multilinear Automatic Apparatus for Processing Immunoassays, Serial No. , filed (IP-0905).

**Field of the Invention**

This invention relates to a carrier device for holding samples which are to be analyzed in a manner which facilitates their combination with analysis reagents and apparatus for transferring the results for determination by further instrumentation.

**Background of the Invention**

In the analytical field it is often necessary to process samples of reagents for analysis by combining them with various reagents, support particles and the like. Following such analysis, it is then necessary to transfer the processed sample held in a reaction device back to a device which facilitates processing the results. This is particularly true when the interim processing of a sample involves repeated steps that typically required immunoassay techniques. These include reaction time and wash cycles all involving the use of other particles to facilitate the chemical reactions. In a case of immunoassays, it is necessary to vortex the contents of a reaction vessel to maintain the particles suspended so that the reaction may go to completion. Such analysis may also present difficulties inasmuch as the samples may come from different units and all require mounting on the processing carrier. A further problem arises due to the combination of the samples and reagents during the processing. It is difficult to keep track of the proper sample to make sure it

receives the processing needed and does not become mixed up with other samples so that the integrity of the analysis is lost.

### Summary of the Invention

Many of these problems are solved by the device of this invention which facilitates the analysis of samples in a reaction vessel. The device comprises a top member having an end portion, a support for the top member, a transparent container having analysis reagents contained therein and having a header containing an instruction code formed on the header, a sample holder being removably mounted on the top member adjacent the header, and a reaction vessel holder mounted by the top member in the end portion, whereby the sample may be positioned in the reaction vessel for reaction and thereafter transferred to the transparent container for analysis.

In a particularly preferred embodiment, the device of the invention is mounted to permit the sample to be nutated. The reaction vessel itself comprises an inner container having a longitudinal axis and which contains a first reagent and an outer container coaxially positioned about the upper portion of the inner container, the outer container having a second reagent. It is desirable that the transparent container be slidably removeable from the top member to facilitate its use and transfer for further analysis.

The apparatus of this invention maintains three units together, i.e., the sample, the reagent for analysis and the ultimate processed sample in a separate container. This facilitates processing samples and maintains all the units necessary for analysis together during the analysis time interval. Multiple sample cups may be simply clipped on to the carrier for use with different sample input and separate incubation is permitted by the structure of the carrier for material within the reaction vessel.

### Brief Description of the Drawings

This invention will be more clearly understood when considered in conjunction with the accompanying drawings in which like reference numerals refer to like components in each of the drawings, in which:  
Figure 1 is an exploded view of the carrier device constructed in accordance with this invention;  
Figure 2 is a section taken through the stopper of a container along the lines 2-2 of Figure 1; and  
Figure 3 is a section taken along the lines 3-3 of Figure 1 particularly depicting the construction of the sample holder.

### Detailed Description of the Preferred Embodiment

There may be seen in Figures 1, 2, and 3, exploded sectional views of one of the carriers constructed in accordance with this invention. The carrier is seen to contain a hollow, molded housing 50 defined by a pair of sidewalls 52, a top plate 58, and a base support 60. A drive bar 140 is positioned in the lower portion between the sidewalls and secured to the base support as by glueing. This bar has receptacles 61 to facilitate its receiving driving or positioning pins for positioning the bar 140 and hence the carrier. The housing may be formed of polysulfone or any other suitable engineering plastic which is rigid, strong and chemically inert. Attached to the front sidewall (in the drawing) is a partition 54 which cooperates with the top 58 to accommodate the top frame of an analytical pack 62 of an analytical pack 64 which may be the same and preferably is the same as the aca TM pack used in the aca TM Automatic Clinical Analyzer sold by E. I. du Pont de Nemours and Company, Wilmington, Delaware, U.S.A. The aca TM pack has identifying indicia 66 on the top which may be read by appropriate sensors to indicate the particular test being run and includes a hollow septum 68 with an orifice 70 which may be used to introduce materials into the a plastic pack 72. Since the aca TM pack is well known it will not be described further.

In any event, the partition 54 and top 58 cooperate to define an orifice 56 adapted to accommodate the top member of the aca TM pack 62 so it may be inserted into the carrier with the lower side pack 72, which is formed of plastic material. The side pack is to slide in between the two walls 52. The top of the carrier 50 also includes an elongated cup-like member 76 which is adapted to receive a removable sample reservoir 78 containing a reservoir 80. The sample reservoir 78 is held in the position within the opening 76 by appropriate molded grips 82. A fitting feature 84 may be provided for the sample holder 78 to control access to the opening.

To complete the carrier 50, the end of the top member 58 may have an orifice 86 with downwardly extending flanges 88 adapted to hold a reaction vessel holder 90. The flanges 88 are concave on the inside to define a socket which cooperates with the bulbous top on a reaction vessel holder 90 in a ball and socket joint manner. The lower portion of the reaction vessel holder 90 may be shaped as to have an inverted cavity or receptacle 92 at the upper end of which is a bore 94 adapted to receive a pin from a nutating drive member.

In an alternative embodiment of this invention, the reaction vessel holder 90 may be the reaction vessel itself although

the use of the holder is preferred for its long term stability and reliability. If the reaction vessel 90, as a tube holder, is adapted to receive a reaction vessel 100, the vessel has at the upper portion thereof a concentric chamber 102 for holding reaction reagents that typically may be used, for example, in an immunoassay process.

The reaction vessel holder 90 is nutated by an automatic apparatus 104. Although any suitable drive apparatus may be used that provides two directions of linear motion and one direction of rotary motion, that described in copending application Serial No. , filed , (IP-0905) is one that has been used successfully. This drive apparatus provides a bidirectional motion as depicted by the line 106 (Fig. 1) as well as rotational motion as depicted by the line 108 to the reaction vessel holder 90. The drive apparatus is powered by a single bidirectional drive motor 110 which provides rotational motion to the drive apparatus 104. The automatic apparatus engages the reaction vessel holder 90 by elevating a mixing cylinder on which a pin is positioned contiguous the periphery at a point off the elongated axis of the mixing cylinder. In other words the pin engages the bottom end of the mixing vessel 90 in a position which is eccentric to the axis which mounts the mixing cylinder. The apparatus then spins the cylinder moving the engaged end of the vessel into an orbit. If the vessel is managed so that it is free in two rotational directions of freedom, then the contents of the reaction vessel holder 90 will swirl or nutate thus mixing them. Reversal of the drive which spins the mixing cylinder 110 stops the orbiting of the vessel and lowers the cylinder thus disengaging the cylinder from the reaction vessel holder 90.

The carrier device just described has many advantages and it permits in effect the combination of three different functions into a single device. Firstly, sample cups from various analysis devices holding the sample may be snapped into place in the upper portion of the device. Secondly, a reaction tube containing reagents for the analysis of samples may be inserted into a carrier tube which may be inserted into and processed separately from the carrier unit. Thirdly, the completed reacted sample with reagents may be introduced into a separate unit which is slidably removeable from the carrier for subsequent processing and analysis is desired in other machines.

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### Claims

1. An analytical carrier device for facilitating the analysis of samples in a reaction vessel comprising:  
a top member having an end portion,  
a support for the top member,  
a transparent container having analysis reagents contained therein and having a header containing an instruction code formed on the header,  
a sample holder being removably mounted on the top member adjacent the header, and  
a reaction vessel holder mounted by the top member in the end portion, whereby the sample may be positioned in the reaction vessel for reaction and thereafter transferred to the transparent container for analysis.
2. An analytical carrier device as set forth in Claim 1 wherein the sample holder is mounted rotatably to permit its lower end to be nutated.
3. An analytical carrier device as set forth in Claim 1 wherein the reaction vessel holder includes a reaction vessel positioned in the holder.
4. An analytical carrier device as set forth in Claim 1 wherein the reaction vessel comprises an inner container having a longitudinal axis and which contains a first reagent and an outer container coaxially positioned about the upper portion of the inner container, the outer container having a second reagent.
5. An analytical carrier device as set forth in Claim 1 wherein the reaction vessel holder includes a reaction vessel partially rotatable in the holder.
6. An analytical carrier device as set forth in Claim 1 wherein the reaction vessel comprises an inner container having a longitudinal axis and contains a first reagent and an outer container coaxially positioned about the upper portion of the inner container, the outer container having a second reagent.
7. An analytical carrier device as set forth in Claim 1 wherein the transparent container is slidably removable from the top member.
8. An analytical carrier device as set forth in Claim 1 wherein the transparent container is slidably removable from the top member.

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